



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,446	09/20/2004	Yu-Cheng Liu	10683-US-PA-1	5445

31561 7590 03/28/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

WILCZEWSKI, MARY A

ART UNIT PAPER NUMBER

2822

DATE MAILED: 03/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/711,446

Applicant(s)

LIU, YU-CHENG

Examiner

M. Wilczewski

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolters et al., US Patent 5,858,183; in view of Shan et al., Publication No. US 2001/0014540.

Wolters et al. disclose a method of sputtering titanium/ titanium nitride layers (8, 9) in a chamber. The plasma is generated in Ar during deposition of the Ti layer and in a gas mixture of Ar and N<sub>2</sub> during deposition of the TiN layer. After each deposition step in the method of Wolters et al., the target is cleaned (Abstract, Figures 1-3, and Col. 1, lines 12-25, Col. 4, lines 15 and 30-35). Wolters et al. lack anticipation only of using a chamber in which the sidewalls of the chamber are kept at about 50°C – 70°C during the steps of sputtering the Ti/TiN layers and of measuring the sidewall temperature and controlling a flow rate of cooling water based on the temperature of the sidewall. Shan et al. disclose a plasma chamber in which the sidewalls of the chamber are maintained at 65°C in order to achieve a low level of particulate contamination in the chamber. Shan et al. recognize that deposits build up on the interior of the chamber and that these deposits can flake off and contaminate the semiconductor workpiece. Shan et al. teach to maintain the chamber wall temperature by flowing cool water

Art Unit: 2822

through channels surrounding the chamber sidewall 20 (Figure 1 and Paragraph [0085]). It would have been obvious to one skilled in the art to use the sputtering chamber disclosed by Shan et al. to practice the known method of Wolters et al., since this would eliminate the need to perform the cleaning step after each sputtering step. Elimination of the cleaning steps after deposition of each Ti and TiN layer would simplify the manufacturing method thereby resulting in decreased processing times and costs. Hence, one skilled in the art would be motivated to use the sputtering chamber of Shan et al. in the known method of Wolters et al.

Claims 5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolters et al., US Patent 5,858,183; in view of Shan et al., Publication No. US 2001/0014540 further in view of Tsai et al., US Patent 5,930,593.

Wolters et al. and Shan et al. are applied as above. Wolters et al. and Shan et al. lack anticipation of performing magnetron DC sputtering to form the Ti layer in combination with reactive sputtering to form the TiN layer. Tsai et al. disclose a method of forming a Ti/TiN layer on a semiconductor work piece without peeling wherein the Ti layer is deposited by magnetron DC sputtering and the TiN layer is deposited by reactive sputtering (Figure 1(e) and Col. 3, lines 60-64). It would have been obvious to one skilled in the art to employ the sputtering technique of Tsai et al. to form the Ti/TiN layers (8,9) in the known method of Wolters et al., since this sputtering technique prevents peeling.

Art Unit: 2822

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited references disclose various sputtering techniques and/or sputtering chambers in which the sidewalls of the chamber are maintained at a specific temperature during the deposition step(s).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (571) 272-1849. The examiner can normally be reached on Monday and Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



M. Wilczewski  
Primary Examiner  
Tech Center 2800